

Instructive Cultivation Plan for the Program of Mechanical Engineering (Undergraduate Level)

(Pathway from Secondary Vocational to Undergraduate Education)

(Grade 2019)

Course code: 080201

1. Orientation

In recent years, with the breakthrough and improvement of the industrial structure and the continuous improvement of the level of science and technology, the requirements of enterprises for the type, knowledge and ability structure of CNC technology application talents have changed significantly. There is still a gap between the current status of training of CNC technology talents in mechanical engineering programs in application-oriented undergraduate colleges and universities and the actual needs of enterprises, and the comprehensive technical capabilities and professional qualities of the trained talents are insufficient due to the short schooling system. In order to further promote the training and development of numerical control technical talents in line with the international advanced manufacturing industry, and to implement the vocational and technical talent training strategy characterized by "technical skills-oriented, compound skills-oriented, and knowledge skills-oriented", it is necessary to innovate the talent training model and implement the "integrated" education of middle and undergraduate education through.

In order to implement the national and Shanghai medium and long-term educational reform and development planning outline, promote the organic connection of secondary vocational education and higher education, build a "overpass" that connects secondary vocational education and higher education courses, training models and schooling systems, and accelerate the training of knowledge-based, high-skilled and innovative talents who adapt to the development needs of the city economy and social development, Shanghai Second Polytechnic University and Shanghai Industrial Technology School have cooperated on the middle and undergraduate education through training model for mechanical engineering program (numerical control technology), and jointly built a platform for the middle and undergraduate education through training model.

Mechanical engineering program (numerical control technology) middle and undergraduate education through is based on the 7-year schooling system, and implements the "3+4" secondary vocational education model - application-oriented undergraduate education through training model. The 7-year integrated talent training model strengthens school-enterprise cooperation, work-study integration, modularization, and project-led teaching. The training plan attaches importance to the consistent system connection, integrates the curriculum and practical links, and has the advantages of integrating resources effectively, making full use of the transition time, making vocational quality training and professional skills training involved in the talent training process in advance, therefore the training objectives are more clear, professional skills are more prominent, and professional credit is strengthened.

The secondary vocational stage offers highly operational skills application courses, emphasizes the cultivation of operational ability and practical ability; the undergraduate stage offers theoretically strong subject courses to guide students in theoretical exploration and empirical research. "Integration" of middle and undergraduate education through enables vocational education to intervene in advance, and has set up an upward channel for professional competence and academic level, which can better meet the actual needs of enterprise employers for application-oriented talents with professional characteristics and professional requirements for production and service.

The design concept of the middle and undergraduate education through talent training in this program is: based on the principle of "integration" design for middle and undergraduate education

through, guided by the needs of professional positions, in line with students' mental characteristics, cognitive laws, and lifelong development needs, carry out knowledge, ability, professional literacy training for 7 years. Through the construction of an integrated curriculum system based on "core courses", realize a progressive spiral structure of professional knowledge and skills training and improvement paths.

2. Cultivation Objectives

1. General cultivation objectives

This program intends to cultivate knowledge-based, high-skilled on-site engineering and technical talents who have solid basic knowledge of mathematics and natural sciences, basic engineering knowledge, good humanities and professional ethics, master the specialized basic knowledge and application capabilities of mechanical design, mechanical manufacturing and automation, can be engaged in design, manufacturing, technology development, operation management and application support etc. on the front line of industrial production field, and have comprehensive quality of moral, intellectual, physical, aesthetic and work.

The middle and undergraduate education through model focuses more on cultivating knowledge-based and high-skilled engineering and technical talents with application capabilities, such as CNC programming and parts CNC machining, CNC machine tool fault diagnosis and maintenance, CNC machining production organization and management, quality control and production optimization etc. that can be engaged in works related to the application of CNC technology.

2. Objective of value guidance

In order to realize the transformation from a "manufacturing country" to a "manufacturing power", the program of mechanical engineering will expand on the ideological and political education of "manufacturing power" and "craftsman spirit", and based on school-enterprise cooperation, implement the cultivation of social responsibility, teamwork ability, lifelong learning ability and innovative spirit throughout the whole process of talent training and training program design.

3. Objectives students must achieve five years after graduation:

- 1) Be able to use mechanical engineering expertise, technology and skills to analyze and solve mechanical engineering problems related to professional positions, be able to independently solve more complex mechanical engineering technical problems, and can adapt to an independent and team working environment;
- 2) Have good scientific research literacy and teamwork spirit, and be able to undertake, organize or participate in engineering issues related to mechanical engineering from the perspective of social responsibility, legal and ethical training, safety and environmental awareness, and sustainable development.
- 3) Be familiar with the current situation and development trend of mechanical engineering at home and abroad, familiar with industry regulations and standards by learning advanced manufacturing technology at home and abroad through self-learning, and constantly improve their own quality and ability, and adapt to professional and social development.

3. Requirement for Graduation

1. Requirements of ideological and political and moral education

- (1) Strong basic humanities and social responsibility;
- (2) Have engineering professional ethics;

(3) Master scientific learning methods, have the ability to continuously learn and adapt to development;

(4) Have a certain sense of innovation and logical reasoning ability;

(5) Good ability of teamwork, interpersonal communication and communication;

(6) Have a certain international vision and the ability of cross-cultural exchanges and cooperation.

2. Knowledge requirements

(1) Master the mathematics, natural sciences, economics and management knowledge required for mechanical engineering work;

(2) Master the basic theories and basic knowledge of mechanics, electronics, automatic control, and computer applications;

(3) Master the basic skills of engineering drawing, calculation, experiment, test, literature search and design process regulations necessary for this program;

(4) Be able to develop preliminarily new technologies, new processes, and new products in the field of mechanical engineering, and be able to use various technologies, skills and engineering tools in modern mechanical design, mechanical manufacturing, and numerical control processing technology;

(5) Understand the whole process of the conception, design, implementation and operation of mechanical and electrical products, as well as environmental protection and sustainable development related policies and regulations;

(6) Have engineering practice learning experience, obtain initial experiences in learning, practice, design, manufacturing and management in machinery companies, and understand the current situation and development trends of mechanical engineering program.

3. Ability requirements

Students of this program mainly strengthen the basic theory and technology of mechanical design and CNC manufacturing, on the basis of mastering basic knowledge of mechanics, electronics, computers and foreign languages, and necessary humanities and social sciences, mathematics and natural sciences, and are enabled to receive the basic training of modern mechanical engineers from theory to practical application through curriculum design and practice, thus obtaining basic abilities in mechanical design, mechanical manufacturing (especially CNC technology), equipment control, and production organization management.

At the same time, it pays attention to the training of students' professional technical skills. Students' ability of solving practical problems in production practice, CNC machining technology, use and maintenance of CNC machine tools, and production organization management is further improved by introducing relevant national occupation/industry standards and vocational qualification appraisal requirements, normalized extracurricular scientific and technological activities and competitions, school-enterprise joint training mode teaching and enterprise production practice and other practical training links.

2. Service Orientation

Cultivate advanced numerical control technology application talents who have the basic knowledge and skills required for the major of mechanical engineering (numerical control technology), are able to use all kinds of ordinary and numerical control production equipment to complete processing tasks, are able to independently solve the problems of numerical control

processing equipment and numerical control processing technology encountered in production practice, have cross-cultural communication and collaboration capabilities, basic self-learning capabilities and skill development capabilities, and meet the job requirements for numerical control technology application group for advanced manufacturing technology (mainly referring to the engineering and technical talents engaging in CNC manufacturing of machining products and development and improvement of CNC equipment).

4. Schooling system

Seven years

5. Length of study

Flexible study period, generally seven years, the minimum length of flexibility is not less than six years, the longest not more than nine years.

6. Requirements for graduation and degree conferring

Students of this program must complete the minimum credits required for each category of courses and complete all the content specified in extracurricular class according to the requirements of the instructional training plan, and the total credits must reach 151 credits for graduation; those who meet the requirements for bachelor's degree can be conferred bachelor degree in engineering.

7. Discipline

Mechanics and Mechanical Engineering

8. Core Courses

1. Introduction to Engineering (16 course hours)

The purpose of this course is to allow students to understand the engineering problems involved in related engineering programs (especially mechanical engineering program), stimulate their interest in learning engineering programs (especially mechanical engineering program) and clarify their motivations by introducing the basic features and concepts of engineering, solutions to general engineering problems, and the tasks and responsibilities faced by engineers. Through the study of this course, students can put forward some ideas and thoughts for solving engineering problems when facing general engineering problems. The focus of this course is to cultivate students' engineering awareness and lay the necessary foundation for students to study subsequent professional courses.

2. Modern engineering drawing (64 course hours)

This course is a core program basic course for mechanical programs. Its task is to cultivate students' ability to draw engineering graphics, read engineering graphics, and initially conceive spatial shapes. Through the study of this course, students will be able to master the basic theory of projection method, master the projection laws of spatial points, lines, surfaces and bodies, master the projection diagram expression methods of mechanical parts, be able to use common drawing tools and instruments to draw engineering draws correctly and skillfully, master the computer drawing ability of engineering drawings, master the general methods and specific steps of reading engineering drawings, and comprehensively improve the comprehensive quality of mechanical disciplines. Engineering drawings are hailed as the "language of the engineering field" and are important tools for scientific and technological workers to express and exchange technical ideas.

3. Engineering Mechanics (96 course hours)

This course is a theoretical technical foundation course, including "Engineering Mechanics I" and

"Engineering Mechanics II". Through the study of "Engineering Mechanics I", students will be able to select the isolator from the mechanism or structure and draw the free-body diagram accurately; be able to analyze the static force of the component and determine the binding force correctly; understand and solve the friction of the plane force system; correctly calculate the velocity and acceleration of a point, the angular velocity and angular acceleration of a rigid body; understand the relativity of motion, master the method of point motion and synthesis; correctly calculate the velocity and acceleration of each point on a rigid body in plane motion; use dynamics general theorems (theorem of momentum, theorem of moment of momentum, theorem of kinetic energy, theorem of mass center motion, differential equation of fixed axis rotation) to solve dynamic problems; use D'Alembert principle to solve dynamic reaction problems; understand the principle of virtual displacement. Through the study of "Engineering Mechanics II", students will obtain the preliminary ability to simplify general rod-like components into mechanical diagrams; be able to make the internal force diagrams of rods under basic deformation proficiently, calculate their stress and displacement, and carry out strength and stiffness calculations; understand the concept of stress state and strength theory, and apply it to the strength calculation of rods under combined deformation; understand the method of solving simple statically indeterminate problems; understand the concept of stability of compression rods, and be able to calculate the critical load and critical stress of axial compression rod, and check for stability; understand the concepts of dynamic load coefficient in dynamic load and fatigue failure and endurance limit in alternating stress; have a preliminary understanding of the basic mechanical properties and test methods of commonly used materials; have a preliminary understanding of the basic principles and methods of stress analysis in electrical measurement experiments. Engineering and technical personnel who are proficient in the knowledge structure of basic mechanics courses such as engineering mechanics will surely be able to play an important role in promoting our country from a manufacturing country to a manufacturing power.

4. Mechanical principle and innovative design of mechanism (64 course hours)

This course is a theoretical and practical integrated course specially set up by Middle and Undergraduate Education Through training mode. The main content includes mechanism kinematics analysis and innovative design practice. This course mainly teaches the composition principle of the mechanism, basic knowledge of various commonly used mechanisms (such as link mechanisms, cam mechanisms, gear mechanisms, gear trains, intermittent motion mechanisms and other commonly used mechanisms, etc.) and their design methods. Through the study of this course, students will understand the basic theories of mechanism structure, mechanical kinematics and dynamics, master the performance, working principles and design methods of various mechanisms, and obtain the ability to design mechanical system schemes. In the process of plan conception and structure design, combining with the development history of mechanical engineering and the research and development of the pillars of a great power, inspire and cultivate students' ability of analysis, comparison, judgment and decision-making, as well as the sense of responsibility, quality and engineering.

5. Mechanical design (48 course hours)

This course is a basic technical course that trains students to have the ability of mechanical design. Introduce the course from several aspects such as mechanical design criteria, mechanical development history, and research and development of the pillars of a great power. Through this course, students will understand the general knowledge of mechanical design, and understand the main types, performance, structural characteristics, applications, materials, and standards of mechanical components; grasp the basic principles of mechanical design, working principles of mechanical parts, stress analysis, stress state, failure mode, working capacity calculation criteria, etc.; be able to design and calculate simple machines; be trained in design calculations, structural design and drawing, experiments, and technical documentation skills. Through conceiving creativity and innovative design, the course can integrate industry standards, safety awareness, responsibility awareness and other concepts into mechanical design.

6. Electrician and Electronics (48 course hours)

This course will enable students to master the basics of electrical engineering and electronics necessary for the program. Through the study of this course, students will grasp the basic concepts and basic laws of circuits, be familiar with the basic analysis methods of DC and AC circuits; be familiar with the transition process of circuits, and obtain the ability to read and analyze relay contact control circuits; be familiar with the knowledge of factory power transmission and distribution and safe power use; master the application characteristics of common semiconductor components and the application of amplifying circuits and integrated operational amplifiers, be familiar with negative feedback circuits, and be familiar with gate circuits and combinational logic circuits, and trigger sequential logic circuits; be familiar with the basic experimental methods of electrical and electronic application technology. The study of this course is a necessary condition for students to become builders in the field of mechanical and electrical integration in the process of socialist modernization and to inherit the spirit of craftsmanship.

7. Technology of Mechanical Manufacture (64 course hours)

This course integrates the teaching content of the mechanical manufacturing process courses, mainly teaches the basic knowledge and related manufacturing technology in the mechanical manufacturing process, mainly including the selection of common metal materials and main heat treatment methods; basic knowledge of metal blank casting, forging, and welding forming methods; basic knowledge of cutting principles; various cutting methods of common parts surface and basic knowledge of machine tools, tools, technology and other aspects required for the cutting process; design principles and methods of fixtures. Through the study of this course, students will master the ability to compile processing procedures and related technologies for medium-complex mechanical parts. In the course of the study of this course, students will be cultivated for the working spirit of craftsmen from a great country of seeking truth from facts, closely integrating theory with practice, and studying hard.

8. CNC machine tools and programming (48 course hours)

This course is one of the program compulsory courses. Based on the basic knowledge of metal cutting machine tools, this course teaches the basic concepts of CNC machine tools, the mechanical structure of CNC machine tools; the functions and interpolation principles of CNC systems; the form and composition of servo drive systems; the application knowledge of the selection and maintenance of CNC machine tools; the characteristics and analysis methods of CNC machining technology, and based on the FANUC system (or other systems), introduces the commonly used programming instructions of CNC lathes, milling machines, and machining centers, as well as the methods and steps of manufacturing program programming. The training objective of this course is to enable students to understand the structure and working principle of typical CNC machine tools, be familiar with and master the basic programming methods of CNC machine tools, and be able to independently complete typical parts processing. With the development of China's manufacturing and intelligent manufacturing industry, the "pillars of great power" demonstrates that China's manufacturing is moving towards mid-to-high end, and CNC technology is one of its supports. Learning this course well and under the guidance of the spirit of craftsmen and model workers, graduates will lay a solid foundation for making a powerful country.

9. Practical training (Related courses)

The practice of this program includes two parts: in-class experiment and independent practice. Some of these courses adopt a teaching method that integrates theory and practice, and redesign and develop the teaching contents for the middle and undergraduate education through training program, which contains more practical links.

The independent practice links mainly include: interchangeability and measurement technology practice, mechanical design course design, mechanical manufacturing course practice, enterprise production practice, mechanism process specification design practice, CNC equipment failure analysis and practice, CNC machining comprehensive practice, mechanical engineering

comprehensive practice, graduation internship and graduation design (thesis).

10. Course structure and course hours (excluding extracurricular class)

Category	Total Credit	%	Total Course Hours	Theory Learning	Practical Training
Public course	53	35	1008	940	68
Basic professional courses	31	21	496	429	67
Professional courses	21	14	336	256	80
Vocational practice	34	23	1008	0	1008
General course	11	7	176	154	22
Total	150	100	3024	1779	1245
Theory : Practice(%)	59: 41				

11. Teaching schedule (1)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester	
Public Course	Required	School of Marxism	b1080001	Basic principles of Marxism	test	3	48	42	6	Spring 1	
	Required	School of Marxism	b1080003	Ideological and moral cultivation and legal foundation	non-test	3	48	42	6	Spring 1	
	Required	School of Marxism	b1080006	Outline of Chinese Modern History	non-test	3	48	42	6	Autumn 1	
	Required	School of Marxism	b1080004	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics I	test	3	48	42	6	Autumn 2	
	Required	School of Marxism	b1080007	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II	test	2	32	28	4	Spring 2	
	Required	School of Marxism	----	Situation and Policy (Modules 1~4)	non-test	2	32	28	4	Autumn 1~spring 2	
	Required	College of Arts and Sciences	b1020080-	Advanced Mathematics A1	test	4	64	64		Autumn 1	
	Required	College of Arts and Sciences	b1020081-	Advanced Mathematics A2	test	4	64	64		Spring 1	
	Required	College of Arts and Sciences	b1020012-	Linear algebra	test	2	32	32		Autumn 2	
	Required	College of Arts and Sciences	b1020013-	Probability Theory and Mathematical Statistics	test	2	32	32		Autumn 2	
	Required	College of Arts and Sciences	b1020076	Calculation method	test	2	32	32		Autumn 2	
	Required	College of Arts and Sciences	b1020062-	College Physics A (module 1)	test	3	48	48		Spring 1	
	Required	College of Arts and Sciences	b1020065-	College Physics B	test	2	32	32		Autumn 2	
	Required	College of Arts and Sciences	b1020066-	College Physics C	non-test	1	32		32	Spring 1	
	Required	College of Engineering	b1020035-	College Chemistry	test	1	32	28	4	Autumn 1	
	Required	Others	b1110003	Military Skills	non-test	0.5	2W			Autumn 1	
	Required	College of Arts and Sciences	b1110002	Military Theory	non-test	0.5	32	32		Autumn 2	
	Required	Physical Education	----	Physical Education I~VI	non-test	3	160	160		Autumn 1~autumn 4	
	Required	College of Arts and Sciences	b1020003-	General English III	test	3	48	48		Autumn 1	
	Required	College of Arts and Sciences	b1020004-	General English IV	test	3	48	48		Spring 1	
Required	College of Arts and Sciences	b1020005-	General Academic English A	test	2	32	32		Autumn 2		
Required	College of Arts and Sciences	---	English development	non-test	2	32	32		Spring 2		
Required	College of Arts and Sciences	b1020018	College Chinese	non-test	2	32	32		Spring 1		
Sub-total (Public Course)							53	1008	940	68	
General Course	Required	College of Engineering	b2011322	Basic Programming C++	test	3	48	32	16	Spring 2	
	Required	College of Engineering	b2011143	Project management	non-test	2	32	26	6	Spring 3	
	Selective	Others	b0-----	Social Science and Humanities Literacy (4 credits) Public Art (2 credits)	non-test	6	96	96		Spring, autumn	
Sub-total (General Course)							11	176	154	22	

11. Teaching schedule (2)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester		
Basic courses	Required	College of Engineering	b2011188	Introduction to Engineering	non-test	1	16	16	0	Autumn 1		
	Required	College of Engineering	b2011246	Modern Engineering Drawing	test	4	64	40	24	Autumn 1		
	Required	College of Engineering	b2011049	Engineering Mechanics I	test	3	48	48	0	Spring 1		
	Required	College of Engineering	b2011397	Foundation of Engineering Material	test	2	32	28	4	Spring 1		
	Required	College of Engineering	b2011050	Engineering Mechanics II	test	3	48	44	4	Autumn 2		
	Required	College of Engineering	b2011310	Mechanical principle and mechanism innovation design	test	4	64	50	14	Autumn 2		
	Required	Work training	b2090001	Electrician and Electronics	test	3	48	42	6	Spring 2		
	Required	College of Engineering	b2011077	Mechanical Design	test	3	48	45	3	Spring 2		
	Required	College of Engineering	b2011091	Fluid Mechanics and Heat Transfer	test	2	32	32		Autumn 3		
	Required	College of Engineering	b2011047	Principles of Engineering Control	test	2	32	30	2	autumn3		
Required	College of Engineering	b2011152	Hydraulic and Pneumatic Transmission	test	2	32	28	4	Autumn 3			
Required	College of Engineering	b2011016	Testing Technology	non-test	2	32	26	6	Spring 3			
Sub-total (Basic courses)							31	496	429	67		
Professional courses	Required	College of Engineering	b2011311	CNC system and principle	test	2	32	28	4	Spring 2		
	Required	College of Engineering	b2011312	Mechanical Manufacturing Technology	test	4	64	56	8	Spring 2		
	Required	College of Engineering	b2011120	CNC machine tools and programming	test	3	48	40	8	Spring 3		
	Required	College of Engineering	b2011250	Industrial Robot	non-test	2	32	24	8	Spring 3		
	Sub-total (required professional courses)							11	176	148	28	
	Selective 8 credits	College of Engineering	b2011182	Programmable Controller (PLC)	non-test	2	32	24	8	Autumn 3		
		College of Engineering	b2011181	Electromechanical Drive Control	non-test	2	32	24	8	Autumn 3		
		College of Engineering	b2011395	Mechanical design practice	non-test	2	32	16	16	Autumn 3		
		College of Engineering	b2011156	Finite Element Analysis and Practice	non-test	2	32	16	16	Autumn 3		
		College of Engineering	b2011141	Modern Design Theory and Method	non-test	2	32	29	3	Autumn 4		
College of Engineering		b2011135	Advanced Manufacturing Technology	non-test	2	32	26	6	Autumn 4			
Trans-disciplinary course	b2011396	Intelligent Manufacturing Execution System(MES)	non-test	2	32	26	6	Spring 3				
Sub-total 1 (selective professional courses)							10	160	108	52		
Sub-total (professional courses)							21	336	256	80		

11. Teaching schedule (3)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hour	Theory Learning	Practical Training	Semester
Practical Training	Required	College of Engineering	b4011088	Modern Engineering Drawing Surveying and Mapping	non-test	2	48		48	Summer 1
	Required	College of Engineering	b4011282	Interchangeability and measurement technology practice B	non-test	3	72		72	Summer 1
	Required	Engineering Training Center	b4090005	Electrician Skill Internship	non-test	1	24		24	Summer 2
	Required	College of Engineering	b4011183	Mechanical Manufacturing Course Practice	non-test	2	48		48	Summer 2
	Required	College of Engineering	b4011108	Enterprise Production Practice	non-test	2	48		48	Summer 2
	Required	College of Engineering	b4011059	Computer Aided Design and Manufacturing Practice	non-test	3	72		72	autumn3
	Required	College of Engineering	b4011285	Mechanism and Process Regulation Design Practice	non-test	2	48		48	spring3
	Required	College of Engineering	b4011283	Failure analysis and practice of CNC equipment	non-test	2	72		72	spring3
	Required	College of Engineering	b4011184	Comprehensive practice of CNC machining	non-test	5	120		120	Summer 3
	Required	College of Engineering	b4011264	Comprehensive Practice of Mechanical Engineering	non-test	3	72		72	autumn4
	Required	College of Engineering	b4011284	Multi-axis Machining and Simulation Practice	non-test	1	48		48	autumn4
	Required	College of Engineering	b4000012	Innovation and Entrepreneurship in Mechanical Engineering	non-test	2	48			spring3
Required	College of Engineering	b4011247	Graduation Practice and Graduation Design of Mechanical Engineering (Thesis)	non-test	6	288		288	spring4	
Sub-total (professional practice)							34	1008	1008	
Extracurricular Class	Required	Others	b5110001	Extracurricular Class	non-test	1	-	-	-	Autumn, spring, summer
Total							151	3024	1779	1245

Professional Certificates can be gained after learning following courses:

Students of mechanical engineering program can choose the following certificates:

- (1) UG/Solidworks, Advanced Certificate, National CAD Center
- (2) Milling worker (CNC milling worker)/turning worker (CNC turning worker), intermediate/advanced skill certificate, Shanghai Vocational Skills Appraisal Center
- (3) Qualification certificate of trainee mechanical design engineer, Chinese Mechanical Engineering Society

Through the study of courses including "Modern Engineering Drawing", "Modern Engineering Drawing Surveying and Mapping", and "Computer Aided Design and Manufacturing Practice", students can participate in the vocational qualification certificate assessment: UG/Solidworks, advanced certificate, national CAD center.

Through the study of courses including "CNC machine tools and programming", "Mechanical Manufacturing Technology", and "Comprehensive practice of CNC machining", students can participate in the vocational qualification certificate assessment: Milling (CNC milling) three-level certificate, Shanghai Vocational Skills Appraisal Center.

12. Schedule for Semesters(Suggested)

semester autumn 1:

Type	Course Name	Assessment	Credit	Course Hour
Required	Outline of Chinese Modern History	non-test	3	48
Required	First foreign language	test	3	48
Required	Advanced Mathematics A1	test	4	64
Required	College Chemistry	non-test	1	32
Required	Situation and Policy	non-test	0.5	8
Required	Physical Education I	non-test	0.5	32
Required	Military Skills	non-test	0.5	2W
Required	Introduction to Engineering	non-test	1	16
Required	Modern Engineering Drawing	test	4	64

semester spring 1:

Type	Course Name	Assessment	Credit	Course Hour
Required	Basic principles of Marxism	test	3	48
Required	Ideological and moral cultivation and legal foundation	non-test	3	48
Required	First foreign language	test	3	48
Required	Advanced Mathematics A2	test	4	4
Required	College Physics A	test	3	48
Required	College Physics C	non-test	1	32
Required	College Chinese	non-test	2	32
Required	Situation and Policy	non-test	0.5	8
Required	Physical Education II	non-test	0.5	32
Selective	General Courses	non-test	2	32
Required	Engineering Mechanics I	test	3	48
Required	Foundation of Engineering Material	test	2	32

semester summer 1:

Type	Course Name	Assessment	Credit	Course Hour
Required	Modern Engineering Drawing Surveying and Mapping	non-test	2	48
Required	Interchangeability and measurement technology practice B	non-test	3	72

semester autumn 2:

Type	Course Name	Assessment	Credit	Course Hour
Required	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics I	test	3	48
Required	Military Theory	non-test	0.5	32
Required	First Foreign Language	test	2	32
Required	Linear algebra	test	2	32
Required	Probability Theory and Mathematical Statistics	test	2	32
Required	College Physics B	test	2	32
Required	Situation and Policy	non-test	0.5	8
Required	Physical Education III	non-test	0.5	32
Selective	General Courses	non-test	2	32
Required	Calculation method	test	2	32
Required	Engineering Mechanics II	test	3	48
Required	Mechanical principle and mechanism innovation design	test	4	64

semester spring 2:

Type	Course Name	Assessment	Credit	Course Hour
Required	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II	test	2	32
Required	First Foreign Language	non-test	2	32
Required	Situation and Policy	non-test	0.5	8
Required	Physical Education IV	non-test	0.5	32
Selective	General Courses	non-test	2	32
Required	Basic Programming C++	test	3	48
Required	Electrician and Electronics	test	3	48
Required	Mechanical Design	test	3	48
Required	CNC system and principle	test	2	32
Required	Mechanical Manufacturing Technology	test	4	64

semester summer 2:

Type	Course Name	Assessment	Credit	Course Hour
Required	Electrician Skill Internship	non-test	1	24
Required	Mechanical Manufacturing Course Practice	non-test	2	48
Required	Enterprise Production Practice	non-test	2	48

semester autumn 3 :

Type	Course Name	Assessment	Credit	Course Hour
Required	Physical Education V	non-test	0.5	16
Required	Fluid Mechanics and Heat Transfer	test	2	32
Required	Principles of Engineering Control	test	2	32
Required	Hydraulic and Pneumatic Transmission	test	2	32
Selective	Programmable Controller (PLC)	non-test	2	32
Selective	Electromechanical Drive Control	non-test	2	32
Selective	Mechanical design practice	non-test	2	32
Selective	Finite Element Analysis and Practice	non-test	2	32
Required	Computer Aided Design and Manufacturing Practice	non-test	3	72

semester spring 3:

Type	Course Name	Assessment	Credit	Course Hour
Required	Project management	non-test	2	32
Required	Testing technology	non-test	2	32
Required	CNC machine tools and programming	test	3	48
Required	Industrial Robot	non-test	2	32
Required	Mechanism and Process Regulation Design Practice	non-test	2	48
Required	Failure analysis and practice of CNC equipment	non-test	2	72
Required	Innovation and Entrepreneurship Practice in Mechanical Engineering	non-test	2	48

semester summer 3:

Type	Course Name	Assessment	Credit	Course Hour
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Required	Comprehensive practice of CNC machining	non-test	5	120
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semester autumn 4:

Type	Course Name	Assessment	Credit	Course Hour
Required	Physical Education VI	non-test	0.5	16
Selective	Modern Design Theory and Method	non-test	2	32
Selective	Advanced Manufacturing Technology	non-test	2	32
Selective	Intelligent Manufacturing Execution System(MES)	non-test	2	32
Required	Comprehensive Practice of Mechanical Engineering	non-test	3	72
Required	Multi-axis Machining and Simulation Practice	non-test	1	48

semester spring 4:

Type	Course Name	Assessment	Credit	Course Hour
Required	Graduation Practice and Graduation Design of Mechanical Engineering (Thesis)	non-test	6	288

13. Prerequisite for Course Study

No.	Course Name	Prerequisite Course	No.	Course Name	Prerequisite Course
1	Engineering Mechanics I	Advanced Mathematics A1	7	CNC machine tools and programming	Modern Engineering Drawing
		Advanced Mathematics A2			Mechanical Design
		College Physics			Mechanical Manufacturing Technology
2	Mechanical principle and mechanism innovation design	Advanced Mathematics A1	8	Advanced Manufacturing Technology	Modern Engineering Drawing
		Advanced Mathematics A2			Mechanical Design
		Engineering Mechanics I			Mechanical Manufacturing Technology
3	Mechanical Design	Engineering Mechanics I	9	Hydraulic and Pneumatic Transmission	Advanced Mathematics A1
		Engineering Mechanics II			Advanced Mathematics A2
		Modern Engineering Drawing			Modern Engineering Drawing
		Mechanical principle and mechanism innovation design			College Physics
4	Electrician and Electronics	Advanced Mathematics A1	10	Computer Aided Design and Manufacturing Practice	Modern Engineering Drawing
		Advanced Mathematics A2			CNC machine tools and programming
		College Physics			Mechanical Manufacturing Technology
5	Principles of Engineering Control	Advanced Mathematics A1	11	Mechanical Design Practice	Mechanical principle and mechanism innovation design
		Advanced Mathematics A2			Mechanical Design
		College Physics			Computer Aided Design and Manufacturing Practice
		Electrician and Electronics			
6	Mechanical Manufacturing Technology	Modern Engineering Drawing	12	Testing technology	Electrician and Electronics
		Foundation of Engineering Material			College Physics
		Interchangeability and measurement technology practice			

14. Extracurricular Class

Through taking extracurricular classes, students are encouraged to take part in academic lectures, social practice activities, campus cultural and sports activities, innovative and entrepreneurial activities, voluntary activities, etc. to improve their social adaptability and enhance the competitiveness in the job market. Details are specified in Students' Manual.